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A Social Cognitive Perspective of Physical-Activity-Related Behavior in Physical Education

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The purpose of the current study was to examine student and teacher physical-activity-related behavior using the theory of planned behavior and self-efficacy theory. Although teachers reported an overwhelmingly positive attitude toward teaching physical activity lessons to promote fitness development, they only devoted 4% of their class time to actually demonstrating and promoting fitness. Students were quite sedentary during class spending 61% of class time sitting, standing, or lying down. Using hierarchical regression analyses, teachers' attitudes toward teaching physically active physical education classes accounted for 50% of the variance in teachers' intention. Teachers who demonstrated/promoted fitness and who limited their general instruction and management of students were more likely to have students involved in moderate to vigorous physical activity than teachers who spent less time demonstrating/promoting fitness and more time in general instruction and management.

Key Words: physical activity, teacher intentions, theory of planned behavior, social cognitive theory

Physical Activity and Schools

Researchers examining relationships among physically active lessons, fitness, and health have suggested that school physical education is an ideal institutional setting for children to be physically active (Sallis et al., 1997). Position papers of leading professional health and physical activity organizations have all emphasized the importance of providing moderate to vigorous physical activity (MVPA) in school physical education programs. The Council for Physical Education for Children (COPEC) has stated, "Regular physical education programs (preferably daily) should provide a significant amount of the time in activity necessary to meet the guidelines in this report" (Corbin & Pangrazi, 1998, p. 14). The Healthy People 2010 objectives for school physical education indicate that 50% of class

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time should be spent with the students physically active (United States Department of Health and Human Services [USDHHS], 2000). Finally, the National Center for Chronic Disease Prevention and Health Promotion has stated that a significant portion of children's weekly physical activity should be obtained during physical education classes (USDHHS, 1996).

Investigators have supported the importance of school-based physical education programs in promoting physical activity and health. Sallis and his colleagues (1997) reported that a health-based physical education curriculum, implemented by physical education specialists and trained classroom teachers, successfully increased children's physical activity levels. In a review of 19 intervention studies, Almond and Harris (1998) also found that 8 of them successfully increased physical activity levels in physical education classes.

Clearly, school physical education provides an excellent opportunity for children to be active. Teachers should have strong intentions to provide physically active classes and also to be effective teachers. Effective teaching results in the intended learning outcomes (Berliner, 1987). Teachers need skill sets to organize physical education classes to provide for at least 50% of class time in physical activity along with maximizing student opportunities for good practice (i.e., appropriate to the learning goal, individualized, reasonably high success rate, high level of processing, etc.; Rink, 2003).

Teachers are assumed to be major determinants of whether children and youth in physical education classes engage in high levels of physical activity (Martin, Kulinna, Eklund, & Reed, 2001). Teachers' intentions to teach physically active classes are considered critical because intentions are significant determinants of behavior (Ajzen & Madden, 1986). These assumptions, however, have rarely been subjected to empirical scrutiny in physical education pedagogy research. Hence, this study was designed to investigate determinants of teachers' intentions to teach physically active classes and relationships with teacher and student behaviors.

Social Cognitive Theory

The current study was developed using social cognitive theory, which is a general theory of human behavior stipulating that people are active agents in their own lives as they generate thoughts, feelings, and behaviors. Social cognitive theory rejects the notion that behavior is purely a function of environmental influences or of personality traits (Bandura, 1997). According to Bandura, human agency is the result of both social and self influences. People are not passive recipients of social influence or driven by unalterable personality traits. They are proactive agents in their own lives as they actively attempt to control how social factors impact their lives. Similarly, people exert tremendous self-influence as they engage in reflective thought, adopt goals, anticipate outcomes, and self-regulate their own behavior. As an overarching metatheory, social cognitive theory provides a broad framework for the theory of planned behavior (TPB; Ajzen, 1991) and self-efficacy theory (SET; Bandura).

The Theory of Planned Behavior. The TPB posits that teachers with strong intentions to teach physically active classes are more likely to do so than teachers with weaker intentions (Godin & Shephard, 1986; Wurtele & Maddux, 1987). Implicit in this position is the notion that teachers have the ability to transform their intentions into behavior. Intentions, however, are impacted by social influences (i.e., subjective norm) and individuals' attitudes. According to the TPB, it

can be assumed that teachers with positive attitudes and a supportive social environment (e.g., school administrators) are likely to have strong intentions to teach classes with high levels of student physical activity. For example, if teachers have a history of being physically active and enjoy physical activity, it is likely that they will have positive attitudes towards physical activity and subsequently believe that they should be teaching physically active classes (i.e., have intentions). Similarly, if teachers perceive that parents want them to teach physically active lessons and administrators are supportive (e.g., buy them jump ropes) of their efforts to teach physically active classes, then teachers are more likely to do so compared with teachers who sense that parents and administrators do not care what they teach.

Because people's behaviors are not always under their volition, perceptions of control are also important (Ajzen, 1991). The TPB suggests those teachers with a strong sense of control over what and how they teach will develop stronger intentions compared with teachers who perceive that they have little control. Therefore, teachers who feel free to teach physically active lessons are more likely to develop intentions to teach physically active lessons compared with teachers who feel a lack of control.

Self-Efficacy Theory. Self-efficacy theory (Bandura, 1997) also provides a theoretical foundation for the current study. Self-efficacy theory highlights the importance of self-efficacy and outcome value or importance (Maddux, 1995). Self-efficacy in particular is thought to be the primary determinant of human agency. According to SET, teachers who feel efficacious about providing students with high levels of physical activity in their classes and who have important program goals such as the promotion of physical activity are likely to teach physically active classes. Teachers with a strong sense of efficacy in their ability to help their students be physically active are likely to work hard, persist when frustrated, learn effective teaching strategies, and engage in problem solving (Bandura, 1997). In contrast, teachers lacking efficacy are more likely to give up when frustrated and lack motivation to persist in the face of difficulty.

Although critical cognitions such as efficacy and program-goal importance impact behavior, people are also influenced by their feelings (Bandura, 1997). For example, although teachers might strongly value physical activity and feel quite efficacious about their ability to teach physically active classes, feelings of distress or anxiety might undermine their efforts (Bandura). In contrast, feelings of enthusiasm and excitement might empower cognitions of efficacy and importance (Bandura). Research in physical education examining the role of teacher affect, particularly positive affect, is lacking. Thus, to more completely test SET and to address the dearth of research examining the role of emotion in teaching, we assessed teachers' positive and negative affect.

Research in human movement settings has supported the TPB (Gatch & Kendzierski, 1990; Godin, 1994). Gatch and Kendzierski, for instance, indicated that subjective norm, attitude, and perceived behavioral control all contributed to predicting female undergraduate students' intentions to participate in aerobics. Godin reviewed 12 exercise-based studies and reported that intention accounted for 30% of the variance in exercise behavior. Self-efficacy research is also prolific and numerous meta-analyses have supported the important function of self-efficacy in human behavior (Holden, Moncher, Schinke, & Barker, 1990). Holden et al. conducted a meta-analysis of 25 studies on the self-efficacy of children and adolescents. Similarly, Ross (1998) reported on 87 investigations of teacher efficacy

through a meta-analysis. These investigations have all affirmed the beneficial influence of self-efficacy on human functioning.

Social Cognitive Theory in Physical Education Settings

Understanding the determinants of teachers' intentions to teach classes in which their students engage in high levels of physical activity is an important step in understanding children's physical activity participation. A systematic line of research (Kulinna, Martin, Zhu, & Reed, 2002; Martin & Kulinna, 2003, 2004; Martin et al., 2001) has supported the value of investigating the TPB and SET in physical education pedagogy. Martin et al., for example, examined 187 predominately Caucasian physical educators and found that attitude and social influences predicted teachers' intentions. A follow-up study with a larger (N = 342), more ethnically diverse (Caucasian 70.2%, African American 23.3%, Hispanic American 5.2%, and unreported 1.3%) sample supported the TPB, with attitude, subjective norm, and perceived behavioral control accounting for 59% of the variance in teachers' intentions to teach physically active lessons (Martin & Kulinna, 2004).

Self-efficacy theory has received much less support in this line of research. That is, self-efficacy did not significantly contribute to predicting teachers' intentions to teach physically active lessons using a hierarchical self-efficacy instrument (Martin et al., 2001) or a barrier self-efficacy instrument (Martin & Kulinna, 2004). Therefore, in the current study we included additional SET variables (i.e., program-goal importance, affect) to further investigate the relationships among self-efficacy, intentions, and behaviors.

Research examining relationships among teacher intentions, teacher physical-activity-related behavior, and student physical activity behavior is conspicuously lacking in physical education pedagogy research. The value of establishing determinants of teacher's intentions is largely based on the assumption that teacher intentions predict teacher behavior, which, in turn, impacts student learning and behavior. Given the decreased health status of children and youth in the USA over the last 20 years (USDHHS, 1996), it seems particularly critical to determine if teacher physical-activity-related teaching behaviors are associated with student physical activity behavior. Thus, in the present study we examined whether teachers who promoted and demonstrated physical activity and fitness were more likely to have students who were physically active during class than teachers who spent less time promoting and demonstrating physical activity and fitness. Students observed in the current study came from a Midwestern state considered one of the unhealthiest and overweight in the country (Krause & Zhu, 1992, 1993), elevating the importance of the current research study.

Understanding teacher's intentions and related cognitions (e.g., attitudes) is also important for at least three other reasons. First, if teachers have weak intentions to teach physically active lessons, it would suggest that policy makers' (USDHHS, 2000) vision of physical education as a public health vehicle might not be shared by physical education teachers. Second, if intentions are unrelated or minimally related to teacher behavior then clearly other factors are important and might be limiting teachers' intentions. For instance, Thomas (2004) clearly documents the difficulties (e.g., class size) teachers face in trying to increase MVPA in physical education. Third, backing the TPB and SET in a physical education setting would provide further empirical support for the potential generalizability of both theories.

Purposes

Our first major purpose was to determine whether teacher intentions to teach physically active lessons were related to teacher behavior (i.e., promotion of fitness and demonstration of fitness activities). Our hypothesis was that teachers with strong intentions to teach physically active classes would be more likely to spend a greater percentage of their teaching time demonstrating and promoting fitness and less likely to spend time providing general types of instructions and time on other tasks than teachers expressing weaker intentions.

We also examined whether teacher behavior was related to how much time their students spent in MVPA and being inactive (e.g., sitting). Our hypotheses were that teachers who spent more time demonstrating and promoting fitness would be more likely to have students engaged in high levels of MVPA and less likely to have students engaged in lying, sitting, and standing than students of teachers who spent less time promoting and demonstrating physical fitness behaviors.

Our second major purpose was to replicate and extend earlier work of Martin and Kulinna and colleagues using the TPB and SET (i.e., positive and negative affect and program-goal importance; Kulinna et al., 2002; Martin & Kulinna, 2003, 2004; Martin et al., 2001) by examining predictors of teachers' intentions and relationships among the psychosocial variables. We hypothesized that positive affect and program-goal importance would be positively related to intentions to teach physically active classes, whereas negative affect would be negatively linked to intention.

Method

Participants

Teachers. Physical education teachers ($N = 43$; males $n = 27$ and females $n = 16$) from a larger Midwestern city and surrounding suburbs volunteered to participate in the current study. They were from elementary ($n = 20$), middle ($n = 11$), and high ($n = 12$) schools representing urban ($n = 21$) and suburban ($n = 22$) environments. Teachers' ethnic backgrounds included Caucasian ($n = 28$, 65%), African American ($n = 12$, 28%), Hispanic American ($n = 2$, 5%) and other ($n = 1$, 2%).

Students. Four students were randomly chosen from the teachers' videotaped classes ($N = 280$). There was a fairly equitable distribution of girls ($n = 125$) and boys ($n = 139$) with 16 children not reporting their gender. Our sample was 30.9% African American, 12.8% Caucasian, and 53.9% did not report their ethnicity.

Teacher and Student Behavior

The computerized version of the System for Observing Fitness Time instrument (CSOFIT; Keating, Kulinna, & Silverman, 1999) was used to assess teacher and student behavior. The CSOFIT is a duration recording instrument designed to track physical activity levels and variables related to providing opportunities for students to become fit in physical education classes (McKenzie, Sallis, & Nader, 1991). With the CSOFIT instrument, observers press keys corresponding to each of the categories; all class and student variables are recorded along with their actual durations. The CSOFIT instrument was selected because of its ability to produce

reliable and valid scores for teacher and student behavior in physical education (Keating et al.; Rowe, Schuldheisz, & van der Mars, 1997).

Teacher Behavior. The CSOFIT provides researchers with the total amount of time teachers spend in six categories. Teacher behavior categories are operationally defined as: (a) promotes fitness (prompts and encourages activity, praises, increases student engagement); (b) demonstrates fitness (if teacher either demonstrates activity or participates with students); (c) instructs generally (lectures, describes, prompts or provides feedback related to all content except physical fitness engagement, instruction to a second group or individual); (d) manages (nonsubject-matter tasks such as taking attendance and setting up equipment or dealing with behavior problems); (e) observes (monitoring but not talking); and (f) other task (not attending to class responsibilities, for example, reading a paper; McKenzie, 1995). Because teachers taught lessons of various lengths, we converted total time teachers spent in these areas to a percentage score.

Student Behavior. Students were observed, videotaped, and their behaviors coded using CSOFIT (Keating, et al., 1999). Operational definitions for student activity include: (a) lying down (prone or supine on ground); (b) sitting; (c) standing (or barely shuffling); (d) walking (taking more than three steps, holding a push-up position, skill drills unless running laps); and (e) very active (more energy than ordinary walking, sit-ups; McKenzie, 1995).

Similar to previous research using the SOFIT instrument (e.g., McKenzie, 1995; McKenzie et al., 2004; McKenzie et al., 1991; Sallis et al., 1997; van der Mars, Vogler, Darst, & Cusimano, 1998) and CSOFIT instrument (Keating et al., 1999), we created a composite score from the two nonsedentary scores (i.e., walking and very active) in order to have a global index of moderate to vigorous physical activity (i.e., MVPA). Because class time varied in length, total scores were converted to percentage scores.

Instruments

Teacher participants first completed a brief demographic scale followed by instruments used to assess variables from the TPB and SET. The validity of scores produced by all of the instruments have been well established by researchers outside (e.g., Ajzen, 1991) and inside of physical education settings (e.g., Martin et al., 2001). Martin et al. and Martin and Kulinna (2004) provided evidence of concurrent and predictive validity because they found expected associations among variables from the TPB and SET. In the current study we sought to demonstrate construct validity by providing evidence of associations between variables from the TPB and SET and teaching behaviors. The questionnaire instructions defined "large amounts of physical activity" as at least 50% of class time spent with the students physically active in order to be consistent with the Healthy People 2010 objectives for school physical education programs (USDHHS, 2000).

Theory of Planned Behavior Measures. The intention (I) scale includes five items on a 7-point Likert-type scale with anchors of *definitely will not/definitely will* for the statement, "I will try to teach lessons that provide large amounts of physical activity." D*efinitely do not/definitely do* anchored the statements, "I intend to teach . . ." and "I plan to teach . . ." Anchors of *definitely false/definitely true* were used for the statements, "I am determined to teach . . ." and I have decided to teach . . ." These statements were used because they have been recommended by Ajzen (1991), who developed the TPB, and have demonstrated that

they can produce reliable (α = .98 & .96) and valid scores with physical education teachers (Martin & Kulinna, 2004; Martin et al., 2001).

The attitude (ATT) scale is comprised of seven items assessing teachers' attitudes toward providing physically active physical education classes. Each item includes the statement, "Providing large amounts of physical activity (i.e., at least 50% of class time) during my lessons is . . ." Teachers then responded to each item using a 7-point Likert-type scale with opposing affective adjectives (e.g., *unenjoyable/enjoyable*, *unhealthy/healthy*). These items were used to assess attitude as suggested by Ajzen and Madden (1986) and have produced reliable (α = .88 & .93) and valid scores with physical education teachers (Martin & Kulinna, 2004; Martin et al., 2001).

The perceived behavioral control (PBC) instrument is comprised of three items with the following stems and anchors: "How much control do you have over whether you include . . ." (*absolutely no control/complete control*), "It is mostly up to me whether I include . . ." (*strongly disagree/strongly agree*), "If I want to, I can have . . . " (*strongly disagree/strongly agree*). After the stem, each item states ". . . large amount of physical activity (i.e., at least 50% of class time) in my lessons." The items used a 7-point Likert-type scale. The above questions are commonly used to assess PBC and have shown to produce reliable (α = .89 & .93) and valid scores with physical education teachers (Martin & Kulinna, 2004; Martin et al., 2001).

The subjective norm (SN) instrument includes an eight-item scale with four pairs of questions. Each individual item includes a 7-point Likert-type scale. An example pair of questions with anchors follows: "The other teachers at my school believe that it is important that I include large amounts of physical activity (i.e., at least 50% of class time) in my lessons" (*strongly disagree/strongly agree*) and "How motivated are you to comply with the belief of your fellow teachers that you should include large amounts of physical activity (i.e., at least 50% of class time) in your lessons?" (*not motivated at all/extremely motivated*). The instrument was scored by multiplying teachers' perceptions of important social groups' (i.e., fellow teachers, administrators, students, parents) beliefs by their motivation to comply with the important social groups' beliefs. The above four groups (i.e., fellow teachers, administrators, students, parents) were used based on previous work in teacher education (Hoy & Woolfolk, 1993) and have been successfully used in physical education research demonstrating that they can produce reliable (α = .86 & .87) and valid scores in a population of physical education teachers (Martin & Kulinna, 2004; Martin et al., 2001).

Self-Efficacy Theory Measures. The 7-item self-efficacy (SE) instrument was used to assess teachers' efficacy for teaching physically active classes. Teachers were asked "How confident are you in your ability to teach lessons that provide physical activity for 20% of the class time?" and answered on a 0–100% scale. Similar questions followed, substituting the numbers 30%, 40%, 50%, 60%, 70%, and 80% for 20%. It was scored by adding all of the strength scores (0–100) and dividing by the number of levels (i.e., 7 questions). To ease interpretability, data were then divided by 10 (range 0–10). Reliable (α = .85 & .84) and valid scores have been demonstrated with physical education teachers (Martin & Kulinna, 2004; Martin et al., 2001).

The program-goal importance scale is a 9-item measure designed to assess program-goal importance (PGI; Kulinna & Silverman, 1999). Teachers rated how

important the program goal of promoting physical activity and fitness was in physical education on a 5-point Likert-type scale anchored by 1 (*not important*) and 5 (*extremely important*). The following is an example of one of the questions asked: "Providing large amounts of activity time . . . leading to the development of physical fitness in students." Previous research has shown that this scale has produced reliable (α = .88) and valid scores with physical education teachers (Martin & Kulinna, 2004).

Participants completed the Positive (PA) and Negative (NA) Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Both PA and NA are assessed with 10 items each. Examples of PA scale items are *active* and *enthusiastic*. Examples of NA scale items are *irritable* and *upset*. Teachers responded to the stem, "Indicate the extent to which you have been feeling the following during the past few days" on a 5-point Likert-type scale anchored by *not at all* (1) and *extremely* (5). The PANAS has been used in human movement research and has been shown to produce reliable and valid scores (Martin, 2002; Treasure, Monson, & Cox, 1996).

Procedures

Seventy classes were videotaped and coded. Fifteen teachers had one class videotaped, 26 had two classes videotaped, and 1 teacher was observed 3 times. For the teachers with two or three classes coded, if the lesson activities were similar in nature (e.g., both basketball skills), the average score was used for each of the CSOFIT categories. If, however, the two or three lessons were different in nature (i.e., bowling and basketball lessons), the more active lesson was used (only 8% of the lessons). The content, grade level, and specific classes videotaped were not controlled in an effort to provide a representative sample of teachers' classes and the types of lessons they taught. There were 22 different types of lessons across the 70 observed lessons, and they were categorized as follows: softball/baseball (n = 10), swimming/water activities (n = 9), fitness circuits (n = 6), basketball (n = 5), half-court team sports (n = 5), elementary games (n = 4), dance (n = 3), relays (n = 3), golf (n = 3), volleyball activities (n = 3), football activities (n = 2), hula hoops (n = 2), kickball (n = 2), weight training (n = 2), soccer (n = 2), gymnastics (n = 2), Frisbee catch (n = 2), softball game (n = 1), bowling (n = 1), free play (n = 1), calisthenics (n = 1), and running (n = 1). Because the students that were coded were chosen randomly, our final sample size was reflective of a population of approximately 2,100 students (based on an average class size of 30). Both authors and two trained graduate research assistants participated in data collection; videotaping was performed with two cameras, mixer, and split screen in order to make all classroom activity visible on the videotape. Graduate research assistants coded the classes using the CSOFIT instrument.

The CSOFIT instrument involved coding the categories of student activity and teacher behavior. The categories were coded simultaneously and coding only changed when student activity or teacher behavior changed. Target students were randomly selected as they entered the gymnasium and the computer program prompted the coder to rotate focus among the four target students every 4 min.

The guidelines for observer training and data collection using the CSOFIT instrument were based on the validation study for the computerized instrument (Keating et al., 1999) and on the technical descriptions and directions for observers

for the SOFIT instrument (McKenzie, 1995; McKenzie et al., 1991). Graduate student observer training included the simultaneous coding of approximately 30 classes not related to the present study. Data collection began after greater than a 90% interobserver agreement (IOA) was achieved for three consecutive classes between the two coders. The coders simultaneously coded three randomly selected classes during data collection with an interobserver agreement of 99%. The research-team members collected teachers' demographic, TPB, and SET data before videotaping their classes.

Data Analyses

The internal consistencies among the scores produced by the instruments were examined using Cronbach's alpha. Descriptive statistics were calculated for the scales by summing items on each scale and dividing the sum by the total number of items. This method checks the consistency of the values with the Likert-type scales and improves interpretability. In addition, correlational and regression analyses were conducted.

Results

Internal Consistency

Coefficient alpha (Cronbach, 1951) for each of the eight multi-item scales shared a high level of interitem agreement (see Table 1) and were all considered excellent because they exceeded Nunnally's (1978) minimal criteria of $\alpha = .70$.

Table 1 Means, Standard Deviations, Ranges, and Alphas for all Variables in the Model

Variable	*M*	*SD*	Range	Alpha
TPB				
I	6.15	.97	3.40	.96
ATT	6.23	.90	3.29	.95
SN	5.44	1.43	5.25	.95
PBC	6.45	.95	4.00	.93
SET				
SE	8.82	1.39	5.57	.84
PGI	4.32	.70	3.56	.93
PA	4.04	.68	4.00	.92
NA	1.46	.48	1.90	.81

Note: Scaled to range 1–7: I = intention, ATT = attitude, SN = subjective norm, PBC = perceived behavioral control. Scaled to range 1–10: SE = self-efficacy. Scaled to range 1–5: PGI = program-goal importance, PA = positive affect, NA = negative affect. TPB = theory of planned behavior; SET = self-efficacy theory.

Descriptive Statistics for Psychological Variables

Means, standard deviations, and ranges of scores are also presented in Table 1. It is apparent from the means and standard deviations of teachers' scores from TPB constructs that teachers had very strong intentions and felt in control. Teachers also indicated that they had positive attitudes and were motivated to comply with important social groups' (e.g., students, parents, etc.) wishes that they should teach physically active physical education lessons. Similarly, based on variables from SET, teachers felt efficacious and indicated that physical activity, fitness, and health-based physical education program goals were very important. Finally, teachers reported experiencing high levels of PA and low levels of NA over the preceding few days that they had taught.

Descriptive Statistics for CSOFIT Categories

Teachers spent most of their time (i.e., 92%), instructing (44%), managing (28%), or observing (20%) students. Time spent promoting fitness (1%) and demonstrating fitness (3%) was minimal. Time on other tasks was also minimal (4%). Observations of students indicated an almost 60/40 split between sedentary and active behaviors, respectively. For example, students spent 39% of their class time standing and another 21% of their time sitting. They spent 1% of their time lying down. They walked 21% of the time and were very active 18% of the time (or 39% in MVPA).

Correlations Among Teachers' Intentions and Teacher CSOFIT Variables

Correlations among teachers' intentions to teach physically active classes and teacher behaviors ranged from .03 to –.32. The only statistically significant relationship, which was small in magnitude, was a negative one between teachers' intentions and the percentage of time they promoted fitness ($r = –.32$, $p < .05$).

Correlations Among Teacher and Student CSOFIT Variables

Correlations among teacher and student CSOFIT-derived variables can be found in Table 2. A pattern of significant, albeit small, correlations were found between students' MVPA and five of the six teacher behaviors. Teacher behaviors of demonstrating and promoting fitness and engaging in other tasks were positively related to student engagement in MVPA. The teacher behaviors of demonstrating and promoting fitness were also related to student walking or moderate physical activity behaviors. Conversely, teacher behaviors of general instruction and managing were negatively related to student engagement in MVPA. Correlations reflecting sedentary behavior revealed that the teacher behavior of general instruction was positively related to student sitting behaviors. In addition, teacher time spent observing was related to students' standing (positively related) and sitting (negatively related) behaviors. Although the correlations were significant, the amount of variance accounted for in most of the relationships noted was small (e.g., approximately 8–10%).

Table 2 Correlations Among Teacher and Student CSOFIT Variables

Student variables	Teacher variables					
	OBS	GI	M	OT	DF	PF
L	.02	.04	.06	–.09	–.09	–.15
ST	–.42**	.32*	.00	–.03	–.18	–.08
SD	.26*	–.06	.00	–.22	–.05	–.14
WK	.08	–.23	–.17	.23	.28*	.29*
VA	.16	–.17	–.18	.19	.13	.11
MVPA	.19	–.29*	–.26*	.30*	.28*	.28*

Note. Teacher variables: OBS = observing, GI = general instruction, M = managing, OT = other tasks, DF = demonstrating fitness, PF = promoting fitness. Student variables: L = lying, ST = sitting, SD = standing, WK = walking, VA = very active, MVPA = active and walking. $^{**}p < .01$. $^{*}p < .05$.

Correlations Among TPB and SET Variables

The pattern of correlations (see Table 3) indicates strong and meaningful (e.g., three *r*s > .70) relationships among the variables from the TPB (i.e., intention, attitude, subjective norm, and to a lesser extent perceived behavioral control). Far fewer statistically significant correlations (e.g., largest $r = .36$) involving SET measures were found. The strongest correlation ($r = .59$) between variables representing the TPB and SET was between subjective norm and PGI. PGI was positively related to all four TPB measures.

Hierarchical Regression Analysis

The purpose of the hierarchical regression analyses was to evaluate how well variables representing the TPB and SET predicted intention. In order to maintain a minimal subject-to-variable (i.e., 10 to 1) ratio, only the constructs (i.e., attitude, perceived behavioral control, subjective norm, and PGI) that were significantly correlated with intention were used as predictors. Table 4 presents the results of this analysis and shows that attitude made the greatest contribution toward predicting intention by accounting for 50% of the variance with subjective norm accounting for an additional 8%. Perceived behavioral control and PGI did not add any significant variance. The positive beta weights indicate that teachers with the most favorable attitude toward teaching physically active classes and who perceived a social environment supportive of physically active classes had stronger intentions to teach physically active classes than teachers with less favorable attitudes and perceptions of weaker social support (i.e., social norm).

Table 3 Correlations Among TPB (Theory of Planned Behavior) and SET (Self-Efficacy Theory) Variables

	I	*ATT*	*SN*	*PBC*	SE	PGI	PA
ATT	.71**						
SN	.74**	.75**					
PBC	.43**	.18	.48**				
SE	.17	.05	.14	.27			
PGI	.49**	.48**	.59**	.32*	.20		
PA	.08	.11	.17	.09	.03	.36*	
NA	–.18	–.09	–.45**	–.21	–.18	–.11	–.10

Note. I = intention, ATT = attitude, SN = subjective norm, PBC = perceived behavioral control, SE = self-efficacy, PGI = program-goal importance, PA = positive affect, NA = negative affect. TPB variables are italicized.
**$p < .01$; *$p < .05$.

Table 4 Results of Hierarchical Regression on the Prediction of Intention

Step	Variable	R^2	*F*	*df*	$p <$	ΔR^2	B at entry	*p* at entry
1	ATT	.50	40.40	1,41	.001	.50	.71	.001
2	SN	.57	26.81	2,40	.001	.08	.41	.011
3	PBC	.61	20.37	3,39	.001	.04	.23	.059
4	PGI	.61	15.11	4,38	.001	.00	.07	.556

Note. ATT = attitude, SN = subjective norm, PBC = perceived behavioral control, PGI = program-goal importance.

Discussion

Relationships Among Teacher and Student Physical Activity Behaviors

The first major purpose of the present investigation was to examine relationships among teacher and student variables related to physical activity in physical education. Before discussing the correlational and regression findings, it is important to provide a context for discussing our results. One of the more compelling findings in our study was the contrast between teachers' scores on the various psychosocial variables and their teaching behaviors, as well as student physical activity levels. For instance, teachers provided self-report data that was clearly

"pro" physical activity, health, and fitness. They expressed intentions, attitudes, PGI, efficacy, social support, feelings of control, and mood states consistent with teachers who would be expected to have physically active classes. Yet, they only spent 4% of their teaching time on promoting or demonstrating fitness concepts.

Instead of demonstrating or promoting fitness, teachers spent the majority of their class time (72%) instructing and managing students. Student behavior was consistent with teacher behavior (instruction/management) in that they spent most of their time (61%) standing, sitting, or lying down. Fortunately, they spent the other 39% walking or being very active. These findings are consistent with the initial CSOFIT validation study (Keating et al., 1999) during which 15 teachers were observed. For instance, Keating et al. found that teachers spent all of their time in general instruction, managing, and observing with no time devoted to promoting or demonstrating fitness. In the Keating et al. study, students spent about 29% of their time walking, 8% of their time being active, and 63% of their time sitting, standing, or lying down. The current study's results are also somewhat consistent with van der Mars et al. (1998), who examined 54 elementary students' physical activity levels and found a 48/52 ratio between sedentary and active behaviors.

We investigated the relationship between teachers' intentions and their teaching behaviors. Our first set of hypotheses were that teachers with strong intentions would spend more time demonstrating and promoting fitness and less time on other types of behaviors, such as management. We found little support for the intention–behavior relationship. There was only one significant relationship among teachers' intentions and the teaching behaviors measured by the CSOFIT instrument, that is, a significant relationship, as predicted, between teachers' intentions and the percentage of time that they promoted fitness. The direction of this relationship, however, was unexpected. Teachers expressing strong intentions to teach physically active lessons were more likely to spend less time promoting physical activity and fitness compared with teachers reporting weaker intentions.

Although the TPB states that teachers with strong intentions to teach physically active lessons are more likely to teach active classes (Godin & Shephard, 1986; Wurtele & Maddux, 1987), intentions might not be the only contributor to behavior. Godin (1994) found, for example, that intention accounted for 30% of the variance in individuals' exercise behaviors. Effective teaching requires good management (Rink, 2003) and organizational skills. Classes can be organized to maximize physical activity, as well as opportunities for successful practice, by providing equipment for all students and using individual or small group activities. The teacher participants in this study might not have been particularly effective because they spent 72% of class time managing and instructing students. In brief, understanding why teachers' intentions did not translate into behavior consistent with those intentions would seem to be a compelling area for future research.

Significant but small correlations among teacher and student behaviors provide some support for our next set of hypotheses: that the teaching behaviors of demonstrating and promoting fitness are related to higher student engagement in MVPA and less time in sedentary activities. It is unclear why "other tasks" were also related to student MVPA. Results indicating less teacher time spent in management behaviors and providing general instruction were also related to greater student MVPA. Conversely, teacher time spent giving general instruction was related to sedentary behavior in students (i.e., sitting).

The MVPA measure was a composite of the walking and very active variables. Thus, the significant, although small, correlations between demonstrating/promoting fitness and walking and the lack of significant correlations with student very active behavior indicate that the critical student behavior captured by the MVPA variable is walking. This suggests that teachers' promotion and demonstration of physical activity and fitness behaviors influences students' moderate physical activity participation. Other studies have shown that students prefer moderate as compared with vigorous physical activity in physical education classes (e.g., McKenzie, Alcaraz, & Sallis, 1994).

Theory of Planned Behavior and Self-Efficacy Theory

Another major purpose of the current study was to replicate and extend research with the TPB and SET in physical education. Similar to previous research in this area (e.g., Martin & Kulinna, 2004; Martin et al., 2001), strong support was found for the TPB because it accounted for 58% of the variance in intention. Attitude was the most significant construct entering the regression equation because it contributed to 50% of the variance in intention. Although perceived behavioral control and PGI were significantly correlated with intention, they did not add predictive power to the equation. The correlational results for the TPB indicate that attitude, subjective norm, and control were all significantly related to intention (attitude and subjective norm were particularly, meaningful, that is, >.70). These findings are very similar to prior research by Martin et al. and Martin and Kulinna (2004), who found that attitude was the most significant predictor of physical education teachers' intentions compared with perceived behavioral control or subjective norm.

One variable (i.e., PGI) from SET stood out by virtue of its significant correlations with the TPB constructs. PGI was significantly and positively related to intention, attitude, perceived behavioral control, and subjective norm, thus supporting our hypothesis of a relationship between teachers' intentions and PGI. This pattern of results indicates that teachers who value physical activity and fitness are more likely to have strong intentions to teach physically active lessons relative to teachers who place less value on it. Furthermore, they have favorable attitudes, enjoy a sense of social support from significant others (i.e., social norm), and feel in control of their teaching. We did not find a relationship between teachers' positive affect and intentions to provide physically active classes.

A few limitations of the current study should be mentioned. First, although we collected data on many students (i.e., $n = 280$) that generalizes to an even larger number (i.e., $n = 2{,}100$) we did not have a significant number (i.e., $n = 43$) of teachers. If researchers had the resources to collect data from a larger teacher sample (e.g., $n = 300$), then structural equation modeling techniques, for example, could be used to simultaneously test all of the relationships examined in this study. Second, although steps were taken to minimize socially desirable responses from teachers (such as assigning numbers and assuring confidentiality), a form of impression management might still have been operating such that teachers were motivated to provide answers (e.g., positive attitudes) consistent with the values of physical activity and fitness (Leary, 1992). Third, teachers in the current study taught 22 different activities. Clearly, some activities (e.g., running, fitness curriculum) are

quite conducive to continuous movement, resulting in high MVPA. In contrast, other activities might require students to stand and wait between practices, resulting in low MVPA. The wide range of activities taught to students in grades ranging from elementary to high school provided us with an overall snapshot of student physical activity in physical education.

In summary, a few significant findings from the current investigation warrant highlighting. Teachers in the current study reported a positive set of cognitions toward teaching physically active classes in physical education. Teacher behavior did not reflect teachers' intentions, however, toward teaching physically active lessons. Simply having a strong intention to teach physically active lessons is not enough. As Thomas (2004) indicates, teachers need to be supported in a variety of ways (e.g., manageable class sizes, increased contact time, etc.) if we expect them to help our children become healthier through physical education. Teachers also need the resources and skills to teach physically active lessons, such as providing all students with equipment and maximizing successful practice trials.

Teachers spent only 4% of their teaching time demonstrating or promoting fitness. In addition, the pattern of significant, albeit weak, relationships involving student MVPA (particularly walking) and teachers that demonstrated and promoted fitness is encouraging. Thus, there is some tentative support for researchers who advocate that physical education teachers should promote and demonstrate fitness because these behaviors are associated with increased student physical activity levels. Similar to previous research (Martin & Kulinna, 2004; Martin et al., 2001), attitude accounted for about half of the variance in intention. We believe that extending SET to include PGI and mood states offered enough promise, given their relationships to the TPB and subjective norm, respectively, to warrant further investigation.

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